ITU-R Standards Activities

Outputs

- Technical support to the U.S. Administration in Working Party 8B, the Radar Correspondence Group, and Joint Rapporteurs Group 1A-1C-8B, as well as Study Group 3 (see pp 36-37).
- Measurements to determine aggregate emission characteristics and performance of prototype 5-GHz dynamic frequency selection devices.
- Tests and measurements performed on effects of interference from communication system signals into a maritime radionavigation radar.
- Presentations to the ITU-R Radar Seminar.
- Joint development of a method for measuring radar antenna patterns across broad frequency ranges simultaneously with measurement of radar emission spectra.
- Joint measurements of the effects of transmitter rotary joints on radar emission spectra.

Success in worldwide telecommunication markets, as well as effective and compatible use of telecommunications technologies both domestically and abroad, is critical to the long-term economic health of the United States. To achieve these goals, the U.S. Administration actively participates in the single most important worldwide telecommunications standards and regulatory body, the International Telecommunication Union's Radiocommunication Sector (ITU-R), to further its objectives with regard to all forms of wireless communication on a worldwide basis. ITS in turn provides important, ongoing technical support for the U.S. Administration in ITU-R Study Groups 3 and 8; Working Party (WP) 8B; the Radar Correspondence Group (RCG), and the Joint Rapporteurs Group (JRG) 1A-1C-8B. Current areas of interest include (but are not limited to): potential reallocation of radar spectrum; effects on radars of interference from communication systems; dynamic frequency selection technology proposed for 5-GHz spectrum sharing between communication systems and radars; development of radar emission spectrum measurement techniques; and development of more efficient radar spectrum emissions.

A number of proposals have been made by non-U.S. Administrations in ITU-R to introduce communication systems into bands that have heretofore been allocated for radars on a primary basis. One of these is dynamic frequency selection, in which communication systems automatically sense the presence of radar signals and avoid operations on locally occupied radar frequencies. Another approach that has been suggested is to allow interference from communication systems to radars on some sort of statistical basis.

Since the U.S. Administration has made an enormous investment in the development and deployment of both military and civilian radars, it is essential that new systems proposed for spectrum sharing with radars be shown to be electromagnetically compatible with existing and future radars. To this end, in FY 2005 ITS engineers tested the new technology, called dynamic frequency selection (DFS), for the U.S. Administration. The tests were conducted jointly by ITS, the NTIA Office of Spectrum

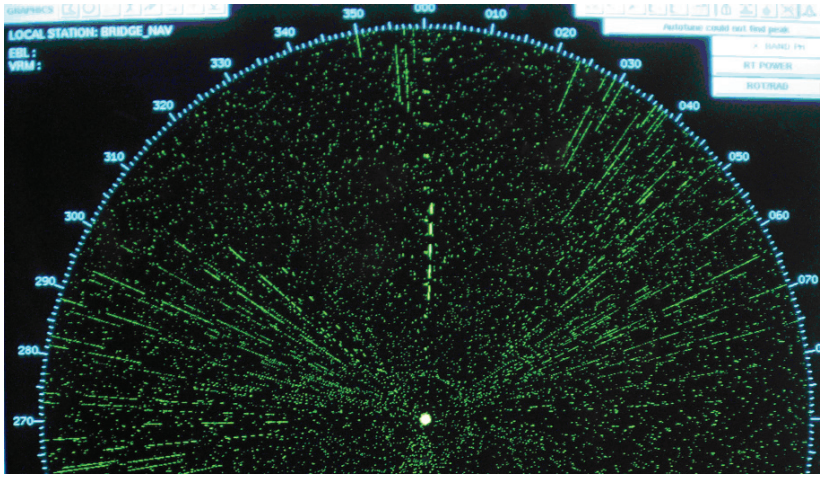

Figure 1. Interference effects in a radar receiver during ITS testing in support of the US Adminstration in ITU-R. Photo by F.H. Sanders.

Management (OSM), other Federal agencies, and industry. Several 5-GHz DFS RLAN prototypes were tested at the ITS Boulder laboratory to determine the extent to which they could successfully sense the presence of radar signals; those results were used by the U.S. Administration at ITU-R meetings in FY 2005.

Figure 2. The 2005 ITU-R Radar Seminar in progress (photograph by F.H. Sanders).

Regarding the statistically-allowed interference technique, ITS and OSM have worked together for several years to study the effects of interference in radar receivers. In FY 2005, interference tests and measurements were performed by ITS and OSM engineers on a maritime radionavigation radar at a Coast Guard site. Interference signals were injected into the radar receiver while targets were observed. At a variety of interference levels, the effects on target detection were observed. The effects of swept-frequency pulses generated by some other radars, called chirped pulses, were also studied. The radar receiver was found to be highly sensitive and susceptible to interference from communication signals at low levels, well below the noise floor of the radar. However, no interference effects were noted in the presence of chirped pulses and other types of radar pulses; these results indicated that the radionavigation radar was highly compatible with other radar systems but not so compatible with communication signals. The test results have been used for U.S. Contributions in WP 8B.

An ITS engineer chairs the Radar Correspondence Group, and ITS provides ongoing support and written Contributions for JRG 1A-1C-8B on future development of radar technology in the X band (9300-9500 MHz). Using data gathered from radar emission measurements at the ITS Table Mountain facility, two ITU-R Contributions were written, calling for changes in the current ITU-R procedures for measurements of radar spectra. In yet another Contribution, a new method for simultaneous measurement of radar emission spectra and antenna patterns across broad frequency ranges was described, again based on data taken at the Table Mountain facility.

ITS and OSM engineers wrote two presentations for the U.S. Administration that were given to the ITU-R as part of its 2005 Radar Seminar. The presentations summarized the results of U.S. studies on DFS, and the results to date of U.S. radar interference studies.

Finally, in FY 2005 ITS organized and hosted an important meeting of Study Group 3 in Cleveland, Ohio, on propagation studies and issues.

Recent Publications

F.H. Sanders, R. Hinkle, and B. Ramsey, "Measurement procedures for the radar spectrum engineering criteria (RSEC)," NTIA Report TR-05-420, Mar. 2005.

F.H. Sanders, "Bandwidth dependence of emission spectra of selected pulsed-CW radars," NTIA Technical Memorandum TM-05-431, Aug. 2005.

F.H. Sanders and B.J. Ramsey, "Comparison of radar spectra on varying azimuths relative to the base of the antenna rotary joint," NTIA Technical Memorandum TM-05-430, Aug. 2005.

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